Check List 8(1): 083-087, 2012
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ISSN 1809-127X (available at *www.checklist.org.br*)

Check List
Journal of species lists and distribution

LISTS OF SPECIES

Anurans of a disturbed area in Jarú, Rondônia, Brazil

Liliana Piatti [1*], Paulo Matthes Orlandi de Amaro [2], Jhonatas Fernando de Jesus Araújo [2], Vitor Quadros Altamore Sanches [2] and Paulo Sérgio Bernarde [3]

1 Universidade Federal de Mato Grosso do Sul, Centro de Ciências Biológicas e da Saúde, Departamento de Biologia. CEP 79070-900. Campo Grande, MS, Brazil.
2 Universidade Luterana do Brasil, Centro Universitário Luterano de Ji-Paraná, Curso de Ciências Biológicas. Av. Engo. Manfredo Barata Almeida da Fonseca, 762. CEP 76907-438. Ji-Paraná, RO, Brazil.
3 Universidade Federal do Acre, Centro Multidisciplinar, Campus Floresta, Laboratório de Herpetologia. Caixa Postal 130. CEP 69980-000. Cruzeiro do Sul, AC, Brazil.
* Corresponding author. E-mail: *lilianapiatti@gmail.com*

ABSTRACT: This paper presents a checklist of anurans species and their distribution in a disturbed area in the municipality of Jarú, Rondônia state, Brazil. Nineteen species belonging to eight families were sampled with pitfall traps and time constrained searches. About 70% of the species were found in a secondary forest and 40% were found only in this environment, while about 57% were found in pastures, with 26% of species being registered only in this habitat. Our results were similar to those of previous studies in other disturbed areas of Rondônia. Species that can be found in different habits were unevenly distributed, with forested environments harboring more species. Despite its nearness to Cerrado and the large number of open areas available, most species found are typical of the Amazon forest.

INTRODUCTION

Amphibians are constantly considered the group of vertebrates most threatened in the world by changes of their original habitats, pathogens, climatic changes, among others (IUCN 2010). However, in mega-diverse countries as Brazil, there are no large-scale population monitoring programs finalized and changes in population size and distribution of anurans may not have a solid scientific basis, or may be in disagreement between researches (Eterovick *et al.* 2005; Haddad 2008).

Brazilian Amazonia is one of the regions that harbor a large diversity of anurans in the world (AmphibiaWeb 2011). In the last compilation of data on amphibians and reptiles of Amazon, 232 species of amphibians were recorded, including 221 species of anurans (Avila-Pires *et al.* 2007). Considering studies addressing amphibians in the Brazilian Amazon region, Amazonas is one of the most intensely studied states (*e.g.* Zimmermann and Rodrigues 1990; Tocher 1998; Lima *et al.* 2006; Menin *et al.* 2008; Ilha and Dixo 2010). In Rondônia state, local checklists are available since 1977, mainly in disturbed places, such as those studies on rapid ecological assessment or studies that cover multiple seasons and years of samplings (Heyer 1977; Vanzolini 1986; Bernarde *et al.* 1999; Brandão 2002; Bernarde 2007; Bernarde and Macedo 2008; Turci and Bernarde 2008; Silva and Silva 2010).

Gathering of data from faunal studies and inventories is the basis for recent techniques that subside biodiversity conservation, such as species distributions models and habitat probability of occupancy for animals (Loyola *et al.* 2008; Becker *et al.* 2010). Furthermore, there are still taxonomic problems in many groups of amphibians and a large amount of new species and of new range extensions are regularly published through faunistic inventories. This inventories coupled with vouchers specimens can support analyses about population variations, and therefore this analyses are the key step in execution of monitoring programs (Becker *et al.* 2010). This paper presents a checklist of anurans and their distribution in a disturbed area in Jarú municipally, Rondônia state, Brazil.

MATERIALS AND METHODS

The study was carried in a secondary forest in which there is an intermittent stream and in an adjacent pasture area where there is an artificial ponds (10°24'15.62" S, 62°29'6.59" W), in the municipally of Jarú, state of Rondônia. The climate is a tropical wet-dry and the native vegetation belongs to "Floresta Ombrófila Aberta" which has been modified by human activities since the 70's (Vanzolini 1986; Oliveira 2002).

Sampling techniques included pitfall traps with drift fences, time constrained searches and occasional encounters, all conducted in 14 events from July 2009 to February 2010. The pitfall traps (two traps in secondary forest and two in adjacent pasture) consisted of 40 m long lines and two 60 L buckets, distant 15 m from each other (see Cechin and Martins 2000 for details). Pitfall traps were kept open for at least two nights in each sample event (total of 672 hours). During this study a total of 56 hours of time constrained searches were done between 18:00h and 22:00h. Visual encounter surveys were conducted by two persons to sample anuran species on the leaf litter, vegetation, pasture, stream and artificial pond's boundaries. Sample efforts applied in pasture and forest areas were similar.

Specimens were identified according to specialized literature (*e.g.* Rodrigues and Duellman 1994; De la Riva *et al.* 2000; Lima *et al.* 2006; Funk *et al.* 2008; Caramaschi 2010; AmphibiaWeb 2011). Voucher specimens were sacrificed with injection of xylocaine, fixed with 5% formalin and deposited at Coleção Zoológica de Referência da Universidade Federal de Mato Grosso do Sul (ZUFMS).

Collecting activities were permitted accordingly to IBAMA 20076-1 process.

Results and Discussion

A total of 118 individual anurans representing 19 species and eight families were registered through pitfall traps and searches. (Table 1; see pictures of some species in Figure 1). The number of anurans species found in the two areas represented about 21% of species already known to occur in the Rondônia state (Heyer 1977; Vanzolini 1986; Bernarde *et al.* 1999; Brandão 2002; Bernarde 2007; Bernarde and Macedo 2008; Turci and Bernarde 2008; Silva and Silva 2010). Recently, *Cochranella adenocheira* was reported in Brazil for the states of Mato Grosso and Pará (Toledo *et al.* 2009). These specimens (eight individuals) represent the first record for the state of Rondônia.

The relative low richness observed in this study (19 species) can be explained by the fact that the sampled area covered only two different kinds of environments, which are under anthropogenic pressures. The landscape in Rondônia state is composed by a mosaic of different vegetations types, especially in the transition between Amazonia and Cerrado (Vanzolini 1986; Oliveira 2002). Moreover, the number of species found in only one locality is usually associated with particular types of vegetation (Bastazini *et al.* 2007, Oliveira and Eterovick 2010). In Rondônia state, the local anurans richness varies between 17 and 47 species (Bernarde *et al.* 1999; Brandão 2002; Bernarde 2007; Bernarde and Macedo 2008; Turci and Bernarde 2008; Silva and Silva 2010), depending on the degree of disturbance of the environment.

Hylidae (N=9) was the most specious family and presented the most abundant species, followed by Leptodactylidae (N=3). This is common in the Neotropical region in general including many Brazilians biomes (Duellman 1988). All species registered are widely distributed in the Amazon basin and surrounding areas, and some anurans such as *Leptodactylus fuscus*, *L. hylaedactylus*, and *Hypsiboas geographicus* are widely distributed, covering much of the Neotropical region (IUCN 2010).

Anurans were irregularly distributed in the environments studied, with only six species registered in both pasture and forested area (Table 1; Figure 2). Cumulative species curve (Figure 3) shows a stabilization to pasture areas, but not to forest, indicating that richness and differences between the two assemblages may be even greater.

Forested areas provide larger amounts of microhabitats

Table 1. Checklist and abundance of anurans from a secondary forest (F) and adjacent pasture areas (F) in municipaly of Jarú, Rondônia state (Brazil).

FAMILY/*SPECIES*	F	P	TOTAL ABUNDANCE
AROMOBATIDAE			
Allobates femoralis (Boulenger, 1884 "1883")	2	0	2
BUFONIDAE			
Rhinella margaritifera (Laurenti, 1768)	2	0	2
CENTROLENIDAE			
Cochranella adenocheira Harvey and Nooan, 2005	8	0	8
HYLIDAE			
Dendropsophus leucophyllatus (Beireis, 1783)	0	10	10
Dendropsophus microcephalus (Cope, 1886)	0	16	16
Dendropsophus sp.	1	0	1
Hypsiboas geographicus (Spix, 1824)	7	8	15
Hypsiboas multifasciatus (Günther, 1859"1858")	1	7	8
Phyllomedusa camba De la Riva, 2000 "1999"	0	1	1
Scinax garbei (Miranda-Ribeiro, 1926)	1	0	1
Scinax nebulosus (Spix, 1824)	1	12	13
*Scinax ruber (*Laurenti, 1768*)*	1	1	2
LEIUPERIDAE			
Engystomops freibergi Donoso-Barros, 1969	6	0	6
LEPTODACTYLIDAE			
Leptodactylus fuscus (Schneider, 1799)	0	3	3
Leptodactylus hylaedactylus (Cope, 1868)	4	0	4
Leptodactylus petersii (Steindachner, 1864)	7	6	13
STRABOMANTIDAE			
Pristimantis fenestratus (Steindachner, 1864)	7	2	9
Pristimantias reichlei Padial and de la Riva, 2009	3	0	3
MICROHYLIDAE			
Elachistocleis helianneae Caramaschi, 2010	0	1	1
Total	**51**	**67**	**118**
Total species	**14**	**11**	**19**

and more arboreal and leaf-litter frog species than pasture environments (Bastazini *et al.* 2007; Bernarde 2007; Bernarde and Macedo 2008; Oliveira and Eterovick 2010). In the present study, 14 species were found in secondary forest and 11 of these were found only in this type of environment (Table 1). Species that live in this forest show abundance values lower and equitative than those species found in pasture, where there is a lower richness and dominance of *Dendropsophus microcephalus*, *D. leucophyllatus* and *Scinax nebulosus* over other species (Figure 2). About 57% of anurans were in pasture and 26% were found only in this habitat (Table 1).

Species sampled exclusively in forested habitat were most sensible to physical and chemical changes (*Cochranella adenocheira*, *Pristimantis reichlei*, *Allobates femoralis* and *Engystomops freibergi*) while those found in high abundance in disturbed area are related to open habitats (*Dendropsophus microcephalus*, *Hypsiboas multifasciatus*, *Leptodactylus fuscus*) or anthropogenic habitats (*D. leucophyllatus* and *Scinax nebulosus*) (Bernarde 2007; Bernarde and Macedo 2008; Toledo *et al.* 2009). Likewise, generalist species like *Hypsiboas geographicus* and *Leptodactylus petersii* were distributed similarly in both sampled environments (Table 1).

The anuran community recorded in this study shows similarities with those found in other disturbed areas of Rondônia state. Species that have different habits were unevenly distributed, with forested environments harboring more species. Despite the proximity with Cerrado and large number of open areas available, most species found are typical of the Amazon rain forest.

Figure 1. Some anurans species found in the municipaly of Jarú, Rondônia state (Brazil). A) *Dendropsophus leucophyllatus*; B) *Hypsiboas geographicus*; C) *Pristimantias reichlei*; D) *Scinax garbei*; E) *Hypsiboas multifasciatus*; F) *Engystomops freibergi*; G) *Rhinella margaritifera*; H) *Scinax ruber*; I) *Elachistocleis helianneae*; J) *Phyllomedusa camba*; K) *Pristimantis fenestratus*; L) *Leptodactylus fuscus*. Photos by Paulo Sérgio Bernarde.

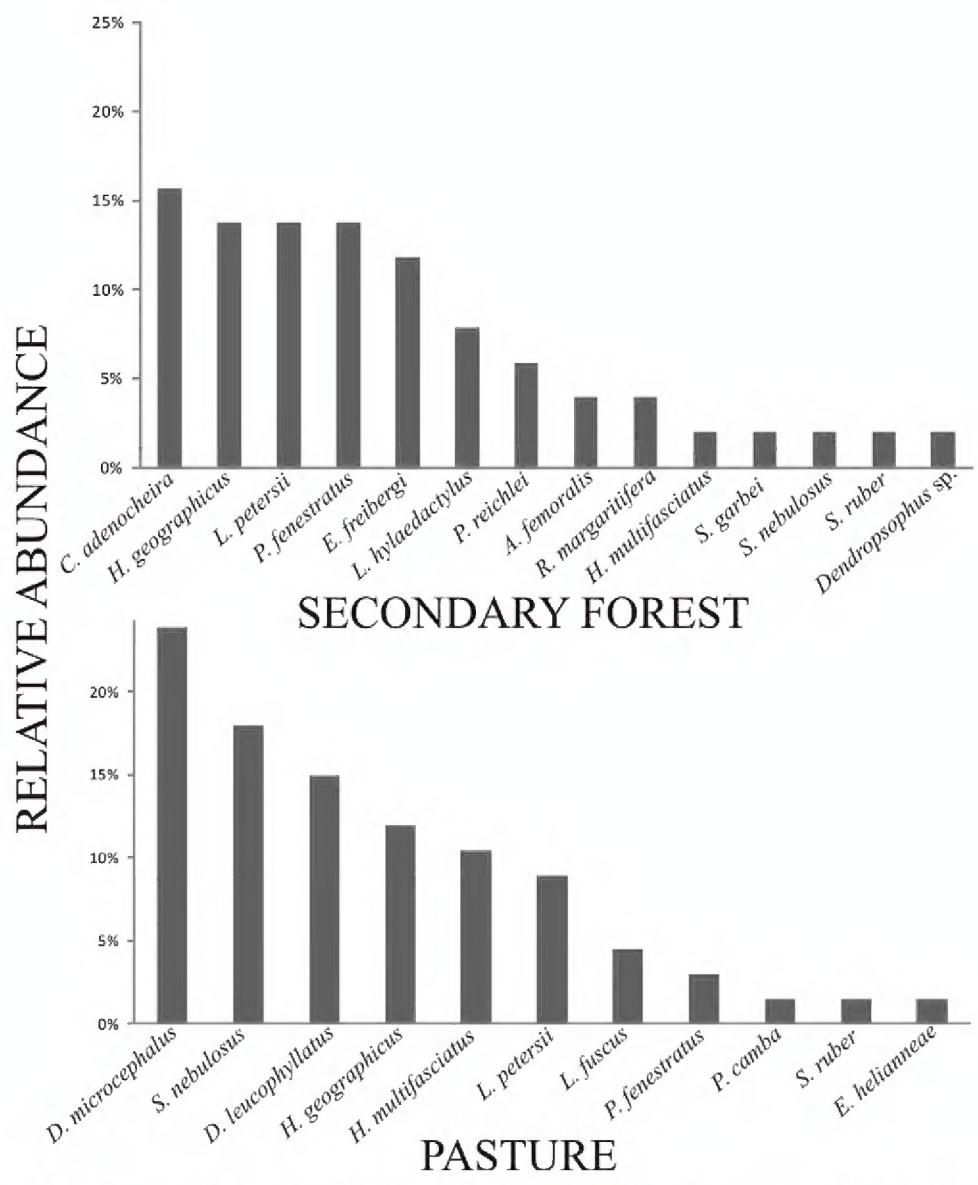

FIGURE 2. Relative abundance of anurans species registered in pasture and secondary forest in Jarú, Rondônia.

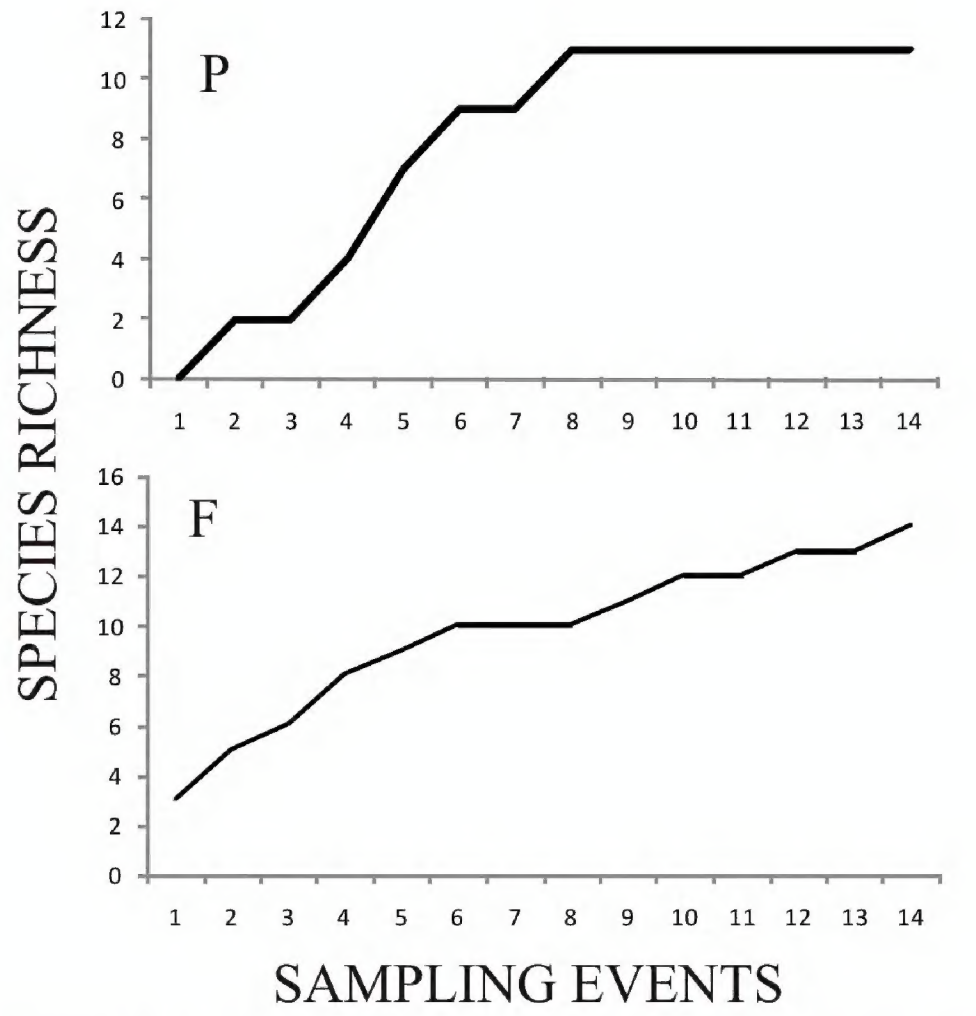

FIGURE 3. Cumulative species curve from pasture (P) and secondary forest (F) in Jarú, Rondônia.

ACKNOWLEDGMENTS: The authors are grateful to Ibama for permission to capture anurans (Process no 20076-1), to Thiago B. Maccarini who kindly improved early drafts in English of the manuscript and F.L. Souza and N.R. de Albuquerque who made valuable suggestions on the manuscript. Conselho Nacional de Pesquisa e Desenvolvimento (CNPq) provided Research Productivity Fellowship to P. S. Bernarde (process 501927/2009-3).

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Received: June 2011
Accepted: February 2012
Published online: February 2012
Editorial responsibility: Marcelo N. de C. Kokubum

Appendix 1. Voucher specimens.
Allobates femoralis: (ZUFMS-AMP2533); *Rhinella margaritifera*: (ZUFMS-AMP2521, ZUFMS-AMP2522); *Cochranella adenocheira*: (ZUFMS-AMP2507, ZUFMS-AMP2508, ZUFMS-AMP2509); *Dendropsophus leucophyllatus*: (ZUFMS-AMP2510, ZUFMS-AMP2511); *Dendropsophus microcephalus*: (ZUFMS-AMP2517, ZUFMS-AMP2518); *Dendropsophus* sp.: (ZUFMS-AMP2516); *Hypsiboas geographicus*: (ZUFMS-AMP2525, ZUFMS-AMP2526); *Hypsiboas multifasciatus*: (ZUFMS-AMP2523, ZUFMS-AMP2524); *Phyllomedusa camba*: (ZUFMS-AMP2534); *Scinax garbei*: (ZUFMS-AMP2527); *Scinax nebulosus*: (ZUFMS-AMP2535); *Scinax ruber*: (ZUFMS-AMP2528); *Engystomops freibergi*: (ZUFMS-AMP2529, ZUFMS-AMP2530); *Leptodactylus fuscus*: (ZUFMS-AMP2512, ZUFMS-AMP2513); *Leptodactylus hylaedactylus*: (ZUFMS-AMP2514, ZUFMS-AMP2515); *Leptodactylus petersii*: (ZUFMS-AMP2519, ZUFMS-AMP2520); *Pristimantis fenestratus*: (ZUFMS-AMP2531, ZUFMS-AMP2532); *Pristimantis reichlei*: (ZUFMS-AMP2536); *Elachistocleis helianneae*: (ZUFMS-AMP2537).